REMARKS

Applicants respectfully request reconsideration of this application in view of the foregoing amendments and the following comments.

Objection to Drawings

In the Office Action, the Examiner objected to the amendment of the drawings received on April 8, 2003, because the amendment lacked a marked-up version showing the changes made in red ink. Applicants have included a marked-up version of the drawings showing the changes made in red ink. Accordingly, the objection to the drawings should be withdrawn.

The Invention

Before addressing the specific claim rejections, it will be helpful to first briefly summarize the invention of the pending claims.

The invention is embodied in a club head for a golf club. Applicants have developed an improved arrangement for the distribution of the club head's "performance mass." Specifically, Applicants recognized that heel/toe weighting does not provide the golf club with the optimum performance characteristics. In particular, heel/toe weighting tends to increase the club head's moment of inertia about two axes: (i) a vertical axis that extends in a generally vertical direction parallel to the strike face, and (ii) a front/back axis that extends in a generally horizontal direction perpendicular to the strike face. However, Applicants recognized that during off-center hits the club head tends to rotate about the vertical axis and the heel/toe axis, but not the front/back axis. Thus, the increased moment of inertia about the front/back axis is "wasted."

Accordingly, preferably most, and more preferably all of the club head's performance mass should be arranged so as to increase the club head's moment of inertia about the vertical axis and the heel/toe axis, but not about the front/back axis. Moreover, it is also important that the performance mass be positioned such that the club head's center of gravity lies

below the club head's physical center. Such an arrangement helps the golfer to get the golf ball airborne. Thus, the performance mass also should be concentrated below the club head's physical center.

Accordingly, one aspect of the invention is a golf club head comprising a strike face and an outer shell that defines an interior volume. The club head has a first moment of inertia about a first axis that extends generally horizontally and parallel to said strike face, and a second moment of inertia about a second axis that lies generally vertically and perpendicular to the first horizontal axis. The club head's center of gravity is positioned below a horizontal centerline of the club head. The first moment of inertia in units of kilograms millimeters squared ($kg\text{-}mm^2$) is greater than or equal to approximately 77 plus .46 times the head volume, in cubic centimeters (cc).

Another aspect of the present invention is a club head comprising a strike face, an outer shell that defines an interior volume, and a plurality of weights. The plurality of weights are positioned substantially along a front/back axis that extends generally perpendicular from said strike face and are also positioned substantially below a horizontal centerline of said club head. In addition, the plurality of weights will comprise 10 percent to 50 percent of the total mass of the club head, wherein the total volume of the club head is greater than or equal to 200 cubic centimeters (cc).

Rejection of Claims under 35 U.S.C. § 103(a)

In the Office Action, claims 1-25 and 29 were rejected under 35 U.S.C. 103(a), as allegedly unpatentable over U.S. Patent No. 6,162,132 to Yoneyama (the "Yoneyama Patent"), in view of a combination of U.S. Patent No. 6,254,494 to Hasebe et al. (the "Hasebe Patent"), U.S. Patent No. 6,319,148 to Tom (the "Tom Patent"), and U.S. Patent No. 4,471,961 to Masghati et al. (the "Masghati Patent").

Regarding the Yoneyama patent, the Examiner on pages 2-3 of the office action stated:

> The patent to Yoneyama discloses the invention substantially as claimed and includes a plurality of weights aligned along a front/back axis that extends generally perpendicular to the striking face and below the horizontal centerline of the head, as required by claims 22-25 and 29. See Figures 1 and 2 in Yoneyama. Further the Yoneyama reference recognizes a relationship between head volume and the weight of the balance weight, noting that a lowering of the center of gravity through an adjustment of the volume and weight of the balance weight may enhance ball carry and trajectory. See col. 2 lines 6-15 along with col. 3, line 47 through col. 4, line 11 in Yoneyama.

Applicants submit, however, that the Yoneyama patent does *not* disclose the invention "substantially as claimed." The Yoneyama patent does indeed disclose placing weight members 10 in the sole plate 6 along the front/back axis to lower the center of gravity. (Yoneyama, col. 3, lines 25-29.) However, the patent fails to disclose the effect the placement of the weights will have on the moment of inertia, and it fails to teach the desirability of placing the weights as close to the face and as far from the face as possible. As acknowledged by the Examiner on page 3 of the Office Action, the Yoneyama patent "does not detail the specifics" of the moments of inertia. Based on calculations by the Applicants, however, placement of the weights at the center portion of the club head in the positions depicted in the Yoneyama patent will *not* result in a first moment of inertia about the horizontal axis greater than or equal to approximately 77 plus 0.46 times the head volume in cubic centimeters, as recited in independent claim 1. (Beach Decl. ¶ 3.)

The Examiner relies on three additional references for suggestions on modifying the club head of the Yoneyama patent to arrive at the claimed invention, stating that the teaching references recognize the "that the location of the center of gravity with respect to the location of the hosel and the horizontal centerline of the club directly affects the value of the moment of inertia as well as the amount of ball carry." The Examiner also states that:

> Using the collective teachings of Yoneyama, Hasebe and Tom, it is clear that the art has recognized that there exists a recognition that the values of the moment of inertia, location of the center of gravity with respect to both the horizontal centerline and the shaft axis as well as the actual volume of the head and mass of any balance weight may be selected dependent upon what is considered

> convenient. In other words, the variables are recognized as being result-effective. Where a parameter(s) optimized is recognized as being result-effective, that optimization is normally an obvious matter to one having ordinary skill in the art.

However, these references fail to make up the deficiencies of the Yoneyama patent.

First, the Hasebe patent teaches the use of single (or multiple) gravity adjusting piece(s) extending along the heel-toe axis and positioned close to the club face in order to achieve a center of gravity nearer to the front face and lower towards the sole portion, and an increased moment of inertia about a vertical axis through the center of gravity. (Hasebe, col. 2, lines 54-58.) As an alternative embodiment, the Hasebe patent teaches placing a gravity adjusting piece (A) near the toe and front face, a piece (B) near the back side, and a piece (C) near the heel and front face such that $A+B \leq C$. (Hasebe, col. 2, lines 1-10.) In effect, the Hasebe patent discloses placing weights at the heel and toe ends of the club head to increase the moment of inertia about the vertical axis. (Hasebe, col. 2, lines57-58.) However, on page 2 of the specification, Applicants expressly recognized the deficiencies of heel/toe weighting. In addition, by teaching the use of heel/toe weighting to maximize club performance, the Hasebe patent teaches away from positioning weights along the front/back of the club head to increase the moment of inertia about the horizontal axis, as defined in claim 1. In fact, placing weights at the heel and toe ends of the club head will not result in a first moment of inertia about the horizontal axis greater than or equal to approximately 77 plus 0.46 times the head volume in cubic centimeters, as required by claim 1. (Beach Decl. ¶ 4.) Thus, the Hasebe does not remedy the deficiencies of the Yoneyama patent, but rather teaches away from the claimed invention.

The Examiner also cites to the Tom patent and states on page 3 of the Office Action that the Tom patent discloses that "the center of gravity may be placed on or below a plane containing the center of gravity of the head and rearward of the shaft centerline by a predetermined amount in order to maximize the moment of inertia and minimize the tendency of the head to rotate." The Tom patent teaches locating the center of gravity as far away from the point of application of the swing force, i.e., the shaft, thereby maximizing the moment of inertia about the shaft axis. (Tom, col. 3, lines 49-54.) Thus, the Tom patent discloses using weights in the club head to maximize the moment of inertia about the shaft axis. However, independent

claim 1 recites increasing the moment of inertia about the horizontal axis, not the shaft axis. In effect, the Tom patent is teaching away from the invention defined in claim 1 because placing weights as far away from the shaft as possible will not increase the moment of inertia about the horizontal axis, as defined in claim 1. In fact, placing weights at this position will not result in a first moment of inertia about the horizontal axis greater than or equal to approximately 77 plus 0.46 times the head volume in cubic centimeters, as required by claim 1. (Beach Decl. ¶ 5.) Thus, the Tom patent does not remedy the deficiencies of the Yoneyama patent to arrive at the claimed invention.

Lastly, although the Examiner cites the Masghati patent, he fails to discuss its alleged significance. The Masghati patent teaches the use of weights 93 and 94 "to increase the moment of inertia along the true axis of rotation as illustrated in FIGS. 16 and 17 rather than along a vertical assumed axis of rotation." (Masghati, col. 6, lines 45-48.) By increasing the moment of inertia along the true of axis of rotation, however, it would be desired to place the weights as far away from that axis as possible. However, placing weights as far away from the true axis of rotation will not increase the moment of inertia about the horizontal axis, as defined in claim 1. In fact, the Masghati patent would teach away from increasing the moment of inertia about the horizontal axis by placing weights at the front and back of the club head. And, placing weights as far from the true axis of rotation as possible will not result in a first moment of inertia about the horizontal axis greater than or equal to approximately 77 plus 0.46 times the head volume in cubic centimeters, as required by claim 1. (Beach Decl. ¶ 6.) Thus, the Masghati patent does not remedy the deficiencies of the Yoneyama patent.

Thus, none of the references cited by the Examiner remedy the deficiencies of the Yoneyama patent. Independent claim 1 defines a club head with an increased moment of inertia about the horizontal axis. Yet, none of the cited references teach increasing the moment of inertia of the club head about the horizontal axis. The Hasebe, Tom, and Masghati patents all teach increasing the moment of inertia about different axes. The Examiner states on page 4 of the Office Action that the location of the center of gravity and moment of inertia "may be selected dependent on what is considered convenient," and "the variables are recognized as result-effective." However, the claimed invention cannot be found to be obvious over the

Yoneyama patent in view of the other cited references if the references do not disclose all of the limitations defined in claim 1. And, modifying the Yaneyama patent in view of the Hasebe, Tom, and Masghati patents will not achieve a club head with moment of inertia about the horizontal axis greater than or equal to approximately 77 plus .46 times the head volume in cubic centimeters, as recited in claim 1. (Beach Decl. ¶ 4.)

In addition, the Hasebe, Tom, and Masghati patents disclose contradictory teachings as to the optimization of the location of the center of gravity and the relative importance of the moment of inertia. Where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another." (MPEP 2143.01, 2100-12.) Thus, Applicants submit that it would not have been obvious to combine the teachings of the Yoneyama, Hasebe, Tom, and Masghati patents based on the result-effectiveness of modifying the center of gravity and moment of inertia. Rather, the Hasebe, Tom, and Masghati patents each disclose different teachings which they believe are the most effective or optimal. Whereas, the claimed invention discloses a distinct and new teaching.

Accordingly, it would not have been obvious to one skilled in the art to combine and modify the teachings of the Yoneyama patent in view of the Hasebe, Tom, and Masghati patents to satisfy the requirements of independent claim 1. For these reasons, the § 103 rejection of independent claim 1, and dependent claims 2-25, is improper and should be withdrawn.

Rejection of Claims 26-28 Under 35 U.S.C. § 102(e)

In the Office Action, claims 26-28 were rejected under 35 U.S.C. § 102(e), as allegedly anticipated by the Yoneyama patent. Applicants respectfully traverse this rejection.

In response, Applicants have amended independent claim 26 to incorporate the volume of the club head and a limitation recited in dependent claim 28. Specifically, independent claim 26 recites that the club head has a volume of greater than or equal to 200 cubic centimeters (cc) and the plurality of weights comprise 10 percent to 40 percent of the total mass of the club head.

The Yoneyama patent teaches a golf club head with two balance weight members 10 provided at a center portion between the toe side 6a and heel side 6b of the sole plate 6, although the use of a single weight member is allowed. (Yoneyama, col. 3, lines 25-28.) In addition, the Yoneyama patent discloses that:

> The weight of the balance weights is preferably less than 8% of the total weight of the head when the volume of the head is more than 250cc. When the volume of the head is more than or equal to 150 cc and less than 250 cc, the weight of the balance weight members may preferably be from 8 to 10% of the total weight of the head.

(Yoneyama, col. 2, lines 7-13.)

Applicants acknowledge that the Yoneyama patent discloses a golf club head with a plurality of weights positioned substantially about a front/back axis that extends generally perpendicular from said strike face and also being positioned entirely below a horizontal centerline of said club head. Applicants submit, however, that the patent fails to disclose a club head having a volume of greater than or equal to 200 cubic centimeters (cc) and a plurality of weights comprising 10 to 40 percent of the total mass of the club head, as required by amended independent claim 26. Rather, the Yoneyama patent teaches that the weight members comprise between 8 and 10% of the total weight of the club head, when the volume of the head is between 150cc and 250cc. Thus, at 200 cubic centimeters, the Yoneyama patent discloses that the weight members would comprise 9% of the total weight of the club head, which is outside of the range of 10 to 40 percent recited in claim 26.

Therefore, the rejection of claims 26-29 under 35 U.S.C. § 102(e) is improper and should be withdrawn.

Conclusion

This application should now be in condition for a favorable action. Allowance of the application is respectfully requested. If for any reason the Examiner finds the application other than in allowance, the Examiner is requested to call the undersigned attorney at the below-indicated telephone number to discuss the steps necessary for placing the application in condition for allowance. If there are any fees due in connection with the filing of this Amendment, please charge the fees to our Deposit Account No. 19-1853.

Respectfully submitted,
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